IEEE ICDM Workshop on
Knowledge Discovery from Climate Data: Prediction, Extremes, and Impacts
6 December, 2009

Call for Papers

First Workshop on Knowledge Discovery from Climate Data

www.nd.edu/~dial/climkd09/

The Climate Change Challenge: Climate change and consequences are increasingly being recognized as among the most significant challenges facing humanity and our planet. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC AR4) shared the 2007 Nobel Peace Prize for providing evidence of human-induced warming at global and century scales. The clear and present need is to develop regional assessments of climate change and consequences, including but not limited to large regional hydro-meteorological changes and extreme events, extreme stresses on ecology, environment, key resources, critical infrastructures and society, as well as detection or attribution and a comprehensive characterization or reduction of uncertainty. A clear link needs to be developed between the science of climate change and the science of impacts analysis for facilitating the process.

Innovations in Data Mining: The analysis of climate data, both observed and model-generated, poses a number of unique challenges: (i) massive quantities of data are available for mining, (ii) the data is spatially and temporally correlated so the IID assumption does not apply, (iii) the data-generating processes are known to be non-linear, (iv) the data is potentially noisy, and (v) extreme events exist within the data. Climate data mining is based on geographic data and inherits the attributes of space-time data mining. In addition, climate relationships are nonlinear, spatial correlations can be over long range (teleconnections) and have long memory in time. Thus, in addition to new or state of the art tools from temporal, spatial and spatio-temporal data mining, new methods from nonlinear modeling and analysis are motivated along with analysis of massive data for teleconnections and long-memory dependence. Climate extremes may be inclusively defined as severe weather events as well as significant regional changes in hydro-meteorology, which are caused or exacerbated by climate change, and climate modelers and statisticians struggle to develop precise projections of such phenomena. The ability to develop predictive insights about extremes motivates the need to develop indices based on nonlinear dimensionality reduction and anomaly analysis in space-time processes from massive data. Knowledge discovery is broadly construed here to include high-performance data mining of geographically-distributed climate model outputs and observations, analysis of space-time correlations and teleconnections, geographical analyses of extremes and their consequences obtained through fusion of heterogeneous climate and GIS data along with their derivatives, geospatial-temporal uncertainty quantification, as well as scalable geo-visualization for decision support.

Topics of Interest:

- Theoretical foundations of mining massive climate datasets for patterns, trends, or extremes
- Algorithms and implementations for the analysis of climate data, including: Patterns / Clusters; Extremes / Outliers; Change Detection; Correlation and Teleconnections; Predictive Models
- Space-time prediction of climate variables and/or climate extremes
- Decision making under uncertainty and predictive uncertainties
- Methods addressing the role of uncertainty in space-time prediction
- High-performance computing solutions for the analysis of climate data
- Studies assessing the impacts of climate change and/or extremes
- Applications that demonstrate success stories of knowledge discovery from climate data

Organizers:

- Nitesh V. Chawla, University of Notre Dame, USA
- Auroop R. Ganguly, Oak Ridge National Laboratory, USA
- Vipin Kumar, University of Minnesota, USA
- Michael Steinbach, University of Minnesota, USA
- Karsten Steinhaeuser, University of Notre Dame, USA and Oak Ridge National Laboratory, USA

DATES: Paper Submission: July 17, 2009; Notification: September 8, 2009; Camera Ready: September 28